

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-052964

(43)Date of publication of application : 25.02.1997

(51)Int.Cl.

C08J 5/18
C08K 3/22
C08L 71/10
C08L 81/06
G02F 1/1333
// G02B 1/04
C08L 81:06

(21)Application number : 07-205560

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(22)Date of filing : 11.08.1995

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(54) POLYETHERSULFONE FILM OR SHEET EXCELLENT IN ULTRAVIOLET LIGHT RESISTANCE

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain the subject film reduced in the lowering of transmittance caused by the irradiation of ultraviolet light and excellent in ultraviolet light resistance.

SOLUTION: This polyethersulfone film contains an inorganic ultraviolet light-absorbing agent having an average particle diameter of 0.01-5 μ m in an amount of 0.05-3.0wt.%, and has a whole light transmittance of $\geq 80\%$ and a light transmittance lowering degree of $\leq 1.5\%$ at a wavelength of 400nm, wherein the lowering of the light transmittance is caused by the irradiation of ultraviolet light having an integrated light quantity of 3000mJ/cm² at a wavelength of 254nm.

LEGAL STATUS

[Date of request for examination] 10.07.2000

[Date of sending the examiner's decision of rejection] 18.11.2003

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's
decision of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

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2

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CLAIMS

[Claim(s)]

[Claim 1] The polyether ape phon film or sheet characterized by for mean particle diameter being the polyether ape phon which contains the ultraviolet ray absorbent of the inorganic system which are 0.01micro-5micro 0.05 to 3.0% of the weight, and for total light transmission being 80% or more, and a light transmission fall on the wavelength of 400nm by the addition quantity of light with a wavelength of 254nm irradiating the ultraviolet rays of 3000 mJ/cm2 being 1.5% or less.

[Claim 2] The polyether ape phon film according to claim 1 or sheet whose retardation of a polyether ape phon film or a sheet is 50nm or less.

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3

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the polyether ape phon film or sheet (it abbreviates to a PES film henceforth) used for the optical application which needs an optical property, or the display field, by vapor-depositing transparent electrodes, such as ITO film, on both sides or one side of a PES film, it can use for liquid crystal displays, such as TN, STN, and TFT, and also can use for the film for disks as an object for optical recording.

[0002]

[Description of the Prior Art] In recent years, research of the film for transparent electrodes aiming at the application of a liquid crystal display transparent electrode, the transparent electrode for touch panels, the switch for transparent electrodes for an electroluminescence side luminescence display, etc. prospers, and it has arrived at the region of utilization in part. A polyether ape phon film, the poly ape phon film, a polyethylene terephthalate film, a polycarbonate film, the polyarylate film, the cellulosic film, the vinyl system film, the norbornene system resin film, etc. are examined as a film for transparent electrodes, and thermal resistance, transparency, non-optical activity, surface smooth nature, solvent resistance, UV-proof nature, etc. are mentioned to the demand characteristics. Recently, in the processing process to a product, the method of application by ultraviolet-rays hardening resin is increasing for the purposes, such as preventing the pyrolysis of the base material at the time of the heat hardening by use of thermosetting resin which obtains improvement in productivity, and the coating film uniform at 10micro or less. By irradiating ultraviolet rays, in order to stiffen ultraviolet-rays hardening resin weak [to ultraviolet rays] and applied, or being put to the natural light among these films, although the PES film is capturing the spotlight as an amorphous film of non-optical activity with the outstanding thermal resistance, a PES film will become yellow, the permeability near 400nm wavelength will fall, and the use range will be limited as an object for optics. Although the improvement measure was found out to the fall and degradation of permeability by ultraviolet rays by mixing the ultraviolet ray absorbent (the salicylic-acid system ultraviolet ray absorbent, the benzophenylene system ultraviolet ray absorbent, the cyanoacrylate system ultraviolet ray absorbent, benzotriazol system ultraviolet ray absorbent) or stabilizer (hindered amine light stabiliser) of an organic system in a film or a cast, since melting extrusion of the PES film was carried out by 300 degrees C - 380 degrees C elevated temperature T die or coat hanger die, it is [a problem that an ultraviolet ray absorbent and a stabilizer decompose] and was impossible. Moreover, although there is also a method of applying the ultraviolet ray absorbent of an organic system or the paint film containing a stabilizer, the increment in a routing counter and decline in the permeability by the paint film take place, and it is not desirable especially as an object for optics.

[0003]

[Problem(s) to be Solved by the Invention] Decline in the permeability by UV irradiation is offering the PES film excellent in few UV-proof nature.

[0004]

[Means for Solving the Problem] It is the PES film characterized by for mean particle diameter being the polyether ape phon which contains the ultraviolet ray absorbent of the inorganic system which are 0.01micro-5micro 0.05 to 3.0% of the weight, and for total light transmission being 80% or more, and a light transmission fall on the wavelength of 400nm by the addition quantity of light with a wavelength of 254nm irradiating the ultraviolet rays of 3000 mJ/cm² being 1.5% or less.

[0005] As an ultraviolet ray absorbent of an inorganic system, SnO, CeO₂, TiO₂, a silica-CeO₂ covering pigment, etc. can be used. 0.01micro - 5micro of mean particle diameter of an inorganic system ultraviolet ray absorbent is 0.01micro-3micro preferably, and the addition of the inorganic system ultraviolet ray absorbent to a polyether ape phon is 0.5 - 2.0 % of the weight preferably 0.05 to 3.0% of the weight. that get a mesh blocked and long-run nature is not obtained when the mean particle diameter of an inorganic system ultraviolet ray absorbent is 5micro or more and melting extrusion is carried out by the T die or the coat hanger die, and push appearance -- the bottom -- the front face of a PES film -- irregularity -- becoming -- the object for optics -- ** -- it is set to the level which cannot be used if it carries out. moreover -- if the addition of an inorganic system ultraviolet ray absorbent exceeds 3.0 % of the weight -- the appearance of a PES film -- bad -- the object for optics -- ** -- it was the level which cannot be used if carried out. When the effectiveness of an ultraviolet ray absorbent does not show up at 0.05 or less % of the weight but an addition irradiates the ultraviolet rays of 3000 mJ/cm² with the addition quantity of light with a wavelength of 245nm, the light transmission of 400nm wavelength falls 1.5% or more, and predetermined contrast is not acquired.

[0006] Since there is little transparency of a beam of light when the total light transmission of a PES film is less than 80% (for example, since contrast cannot use it as a display low when it is used having included in the liquid crystal display), as total light transmission, 80% or more is desirable. Moreover, the difference in a refractive index arises according to the direction of [within a film flat surface], and a retardation (phase contrast) generates a PES film on the wave of the light in a film by this difference. Since the contrast of a liquid crystal display will fall and it will become hard to see about this retardation if 50nm is exceeded therefore, 50nm or less of a retardation is desirable. Although the permeability fall of a PES film by ultraviolet rays decreases by adding an inorganic system ultraviolet ray absorbent, the effectiveness is demonstrated also in the multilayer film or multilayer sheet which has arranged the above-mentioned PES film on both sides or one side. Although a PES film is produced by the melting extrusion process by the T die or the coat hanger die after adding an inorganic system ultraviolet ray absorbent in a polyether ape phon and mixing in it, especially about a process, it is not limited to these.

[0007]

[Example] The silica-CeO₂ covering pigment (mean particle diameter of 1.0micro) which are polyether sulphone (VICTREX PESmade from ICI- 4100G Tg: 228 degrees C), and an inorganic system ultraviolet ray absorbent in the range of 0.000 - 5.2 % of the weight of additions Mix by the predetermined weight ratio and melting kneading is carried out on the conditions of 350 degrees C of cylinder temperatures with 50mmphi extrusion experimental aircraft. Fabricated resin passage in the shape of a sheet by the coat hanger die by which electroless nickel plating was carried out, the cooling roller kept at with a peripheral-velocity outer diameter [of 1.30m / 300mm outer diameter phi for /] 220 degrees C by the electrification fixed approach was made to carry out adhesion immobilization, and the film of 600mm width of face was manufactured by 100micro thickness. As the evaluation approach, a permeability fall irradiates the ultraviolet rays whose addition quantity of lights with a wavelength of 245nm are 3000mJ(s), and measures the permeability fall of 400nm wavelength with a spectrophotometer. Organic-functions evaluation performed the film appearance. Productivity made 300kg the standard by the long-run nature of an extruder.

[0008]

Table 1 Experiment Addition Permeability fall Film appearance Productivity No. [weight %] [%] 0 0.000 3.4 Fitness Have no problem. 1 0.001 3.2 Fitness Have no problem. 2 0.03 2.0 Fitness Have no problem. 3 0.071.4 Fitness With no problem 4 0.12 1.4 Fitness Have no problem. 5 1.1 1.2 Fitness Six without a problem 2.7 1.0 Good With no problem 7 3.2 1.0 Those with a concavo-convex fault Mesh plugging 8 3.71.0 a concavo-convex fault -- many Mesh plugging 9 5.2 0.9 a front face -- common --

common Mesh plugging [0009]

[Effect of the Invention] It is the polyether ape phon film which contains the ultraviolet ray absorbent of the inorganic system whose mean particle diameter is 0.01micro-5micro 0.05 to 3.0% of the weight. The polyether ape phon film whose total light transmission is 80% or more and whose light transmission fall on the wavelength of 400nm by the addition quantity of light with a wavelength of 254nm irradiating the ultraviolet rays of 3000 mJ/cm2 is 1.5% or less can be offered. It can use as a transparent electrode of a liquid crystal display by attaching transparent electrodes, such as ITO film, to both sides or one side, and also can use for the application as a film for disks used for optical recording.

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TECHNICAL FIELD

[Field of the Invention] About the polyether ape phon film or sheet (it abbreviates to a PES film henceforth) used for the optical application which needs an optical property, or the display field, by vapor-depositing transparent electrodes, such as ITO film, on both sides or one side of a PES film, it can use for liquid crystal displays, such as TN, STN, and TFT, and also can use for the film for disks as an object for optical recording.

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PRIOR ART

[Description of the Prior Art] In recent years, research of the film for transparent electrodes aiming at the application of a liquid crystal display transparent electrode, the transparent electrode for touch panels, the switch for transparent electrodes for an electroluminescence side luminescence display, etc. prospers, and it has arrived at the region of utilization in part. A polyether ape phon film, the poly ape phon film, a polyethylene terephthalate film, a polycarbonate film, the polyarylate film, the cellulosic film, the vinyl system film, the norbornene system resin film, etc. are examined as a film for transparent electrodes, and thermal resistance, transparency, non-optical activity, surface smooth nature, solvent resistance, UV-proof nature, etc. are mentioned to the demand characteristics. Recently, in the processing process to a product, the method of application by ultraviolet-rays hardening resin is increasing for the purposes, such as preventing the pyrolysis of the base material at the time of the heat hardening by use of thermosetting resin which obtains improvement in productivity, and the coating film uniform at 10micro or less. By irradiating ultraviolet rays, in order to stiffen ultraviolet-rays hardening resin weak [to ultraviolet rays] and applied, or being put to the natural light among these films, although the PES film is capturing the spotlight as an amorphous film of non-optical activity with the outstanding thermal resistance, a PES film will become yellow, the permeability near 400nm wavelength will fall, and the use range will be limited as an object for optics. Although the improvement measure was found out to the fall and degradation of permeability by ultraviolet rays by mixing the ultraviolet ray absorbent (the salicylic-acid system ultraviolet ray absorbent, the benzophenylene system ultraviolet ray absorbent, the cyanoacrylate system ultraviolet ray absorbent, benzotriazol system ultraviolet ray absorbent) or stabilizer (hindered amine light stabiliser) of an organic system in a film or a cast, since melting extrusion of the PES film was carried out by 300 degrees C - 380 degrees C elevated temperature T die or coat hanger die, it is [a problem that an ultraviolet ray absorbent and a stabilizer decompose] and was impossible. Moreover, although there is also a method of applying the ultraviolet ray absorbent of an organic system or the paint film containing a stabilizer, the increment in a routing counter and decline in the permeability by the paint film take place, and it is not desirable especially as an object for optics.

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EFFECT OF THE INVENTION

[Effect of the Invention] It is the polyether ape phon film which contains the ultraviolet ray absorbent of the inorganic system whose mean particle diameter is 0.01micro-5micro 0.05 to 3.0% of the weight. The polyether ape phon film whose total light transmission is 80% or more and whose light transmission fall on the wavelength of 400nm by the addition quantity of light with a wavelength of 254nm irradiating the ultraviolet rays of 3000 mJ/cm2 is 1.5% or less can be offered. It can use as a transparent electrode of a liquid crystal display by attaching transparent electrodes, such as ITO film, to both sides or one side, and also can use for the application as a film for disks used for optical recording.

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TECHNICAL PROBLEM

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MEANS

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EXAMPLE

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